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The knowledge of myocardial infarction, its risk factors, clinical signs, and complications among Kaunas Hospital of Lithuanian University of Health Sciences patients

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Abstract

Background. Knowledge of myocardial infarction (MI) symptoms and ability to identify them helps to reach a medical facility significantly faster.

Aim. We aimed to identify the knowledge of Lithuanian hospitalized patients about myocardial infarction and to compare the level of knowledge of different groups of age, sex, and education levels.

Methodology. We conducted a study including 101 respondents during their hospitalization at the Kaunas Hospital of Lithuanian University of Health Sciences (LSMU), Department of Cardiology during February–March 2020. The survey was based on an original questionnaire, consisting of general information, multiple-choice questions about MI, and patients' opinions on what would help to reduce mortality due to MI. Patients were interviewed by researchers during their hospitalization.

Results. In total, 70 % of respondents correctly identified the main MI symptom as pain behind the sternum. Further, 62.4 % of respondents were aware that MI pain can spread; the most common areas of spread were indicated as the left arm (26.3 %) and the shoulder blade and mediastinum (19.6 %). The majority of respondents (36.7 %) would like to learn about the symptoms of MI from their family doctor.

Conclusions. Patients' knowledge about MI symptoms and risk factors did not differ depending on age, gender and education. The patients had limited knowledge about MI: although more than half of the patients correctly identified the typical symptoms of MI, their knowledge about other symptoms was insufficient. This can be reversed by educating the public about the disease.

Keywords: myocardial infarction; patients' knowledge; prevention; public education.

Lietuvos sveikatos mokslų universiteto Kauno ligoninės pacientų žinios apie miokardo infarktą, jo rizikos veiksnius, klinikinius požymius ir komplikacijas

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Santrauka

Įvadas. Žinios apie miokardo infarkto (MI) simptomus ir gebėjimas juos identifikuoti padeda pasiekti medicinos įstaigas greičiau.

Tikslas. Mūsų tikslas buvo išsiaiškinti Lietuvos hospitalizuotų pacientų žinias apie miokardo infarktą ir palyginti žinių lygį skirtingose amžiaus, lyties ir išsilavinimo grupėse.

Metodika. Tyrimas įtraukė 101 pacientą jo hospitalizacijos laikotarpiu Lietuvos Sveikatos Mokslų Universiteto (LSMU) Kauno ligoninės kardiologijos skyriuje 2020 metų vasario-kovo mėnesiais. Apklausa vykdyta remiantis originaliu klausimynu, kurį sudarė bendriniai klausimai, daugybinio pasirinkimo klausimai apie miokardo infarktą ir pacientų nuomonė, kokios priemonės padėtų sumažinti mirtingumą dėl MI. Tyrėjai apklausė pacientus jų hospitalizacijos metu.

Rezultatai. Iš viso 70 % respondentų identifikavo pagrindinį MI simptomą – skausmą už krūtinkaulio. Be to, 62,4 % respondentų žinojo, kad MI skausmas gali plisti; daugiausiai žinomos plitimo sritys buvo kairė ranka (26,3 %), mentė bei tarpumentė (19,6 %). Didžioji dalis respondentų (36,7 %) daugiau sužinoti apie MI simptomus norėtų iš savo šeimos gydytojo.

Išvados. Pacientų žinios apie MI simptomus ir rizikos faktorius nesiskyrė tarp skirtingų amžiaus, lyties ir išsilavinimo grupių. Pacientai turi ribotą žinių kiekį apie MI: nors daugiau nei pusė pacientų teisingai identifikuoja tipinius MI simptomus, jų žinios apie kitus simptomus yra nepakankamos. Tai gali būti pagerinta šviečiant visuomenę apie šį susirgimą.

Raktažodžiai: miokardo infarktas; pacientų žinios; prevencija; visuomenės švietimas.

1. Introduction

Myocardial infarction (MI) is an irreversible necrosis of the myocardium, the most common cause of which is impaired myocardial oxygen supply due to interruption of the blood flow in at least one coronary vessel [1]. Ischemic heart disease is the leading cause of death worldwide [2]. According to the data of the Health Statistics, from the Institute of Hygiene, the incidence of MI in Lithuania has been rising in recent years, for example, from 206 cases per 100 000 inhabitants in 2007 to 298 cases per 100 000 inhabitants in 2018 [3], but the mortality rate has been declining only marginally, despite advances in diagnostics and treatment. MI is one of the most common cardiovascular diseases that can strike unexpectedly in any public place [4], which is why it is so important to notice its symptoms and seek help for immediate diagnosis and treatment. Such patients do not always reach a medical facility quickly, as few people immediately react appropriately to a sudden situation due to stress, fear, or lack of knowledge about MI, of which the latter is the main reason [5]. Thus, it is crucial to reduce cardiovascular mortality not only by medication or interventions at the medical facility but also by educating the public about the risk factors and how to recognize and call for medical help. Studies in other countries have shown that patients' knowledge about the symptoms of myocardial infarction is very important and can be useful in providing first aid to the public, while also reducing the time it takes for the patient to arrive at the hospital [6], [7]. However, there are not enough studies assessing patients' knowledge in different countries and the obtained results vary: some studies showed a high level of knowledge, others showed a very low level, and different levels of knowledge between the sexes or education levels were observed in some research. For example, a study conducted in 2020 in Germany, which included 633 respondents, revealed that the mean of correctly attributed AMI symptoms was 7.3 out of 11 and higher knowledge level was observed in females, knowing someone with heart disease, and being an ex-smoker group [8]. In other study, conducted in Lebanon in 2019, even 85 % of participants recognized typical MI symptoms while less than half recognized atypical symptoms [9]. Mannoh et al examined awareness of MI and their study showed that the knowledge of MI symptoms was highest among individuals born in the United States, slightly lower for individuals born in Europe and Russia, and lowest in individuals born in Asia [10]. Only a few studies have been conducted in Lithuania recently; therefore, in this overview, we assessed the knowledge of LSMU Kaunas hospital patients about myocardial infarction, its risk factors, complaints, clinical signs, and complications, comparing the level of knowledge between different groups in terms of age, sex, and education.

2. Materials and Methods

2.1. Study population

The study was performed at the Department of Cardiology, LSMU Kaunas Hospital. The study was conducted in February–March 2020. Patients who met the following inclusion criteria were included in the study: verbal agreement to participate in this research and hospitalization at the LSMU Kaunas Hospital Department of Cardiology during February–March 2020. The exclusion criteria were the

inability to answer the questions on the questionnaire due to cognitive impairment or verbal disagreement. The calculated sample size was 132. Our study sample size was 100 patients because due to Covid 19 pandemic restrictions in 2020 March, the study was finished earlier. In total, 103 patients were randomly selected, two of them were excluded due to cognitive impairment; hence, 101 patients participated in the study.

2.2. Data collection

The survey was based on an original questionnaire prepared by the authors, consisting of general questions (sex, age, education, body weight and height, physical activity, harmful habits, and chronic diseases). The second part of the questionnaire consisted of multiple-choice questions on the main symptoms of MI, the risk factors, the nature of the pain, the areas of spread, and the complications. In this part of the questionnaire, all the answers given were the correct descriptions of MI, so the knowledge was assessed by the number of correct answers the respondent selected from the listed ones. The third part of the questionnaire asked for patients' opinions on what would help to reduce mortality due to MI and from where they would like to obtain more information about the disease. All patients were interviewed by researchers during their hospitalization in the Department of Cardiology at LSMU Kaunas Hospital.

2.3. Statistical Analysis

Statistical analysis of the data was performed using the standard software package (IBM SPSS Statistics 27 (IBM Corp., Armonk, NY, USA)). The reliability of questions and the validity of the scales were tested using Cronbach's Alpha coefficient. For the relevant questions, Cronbach's Alpha coefficient was above 0.7-0.8. Continuous variables are expressed as mean, categorical variables are expressed sa absolute numbers and percentages. The Shapiro–Wilk and Smirnov tests were used to check whether the variables followed a normal distribution. Normally distributed continuous variables were compared using the independent sample T-test. Categorical variables were compared using the Chi-square test. A difference was considered statistically significant when the p-value was < 0.05.

2.4. Ethics Statement

Permissions were obtained from the LSMU Bioethics Center and the director of LSMU Kaunas Hospital. Permission No.: BEC-MF-142. A written consent form from the patients was not required by the LSMU Ethics Committee's regulations because the questionnaire was anonymous, and only anonymized data were used in this study. All participants verbally were informed that anonymity was assured, why the research was being conducted, and how their data would be used.

3. Results

3.1. Analysis of a sample of patients

In total, 101 people participated in the study, of which 65 (64.35 %) were women, and 36 (35.65 %) were men. The majority of respondents (31.7 %) were aged between 61 and 75 years old, approximately a quarter each were aged between 46 and 60 years old and over 75 years old, and the lowest proportion (19.8 %) was respondents under 45 years old. Most of the respondents (34.7 %) had a higher

university education, followed in descending order of educational attainment by secondary, higher non-university, vocational, basic, and primary education. The majority of respondents had never had an MI, about 20 % had arterial hypertension (AH) and/or heart rhythm disorders, and 10 % had no comorbidities (Fig. 1). There was also a question about smoking; most of the respondents (83.1 %) stated that they did not currently smoke, while the options of the physical activity habits were evenly distributed (Fig. 2)

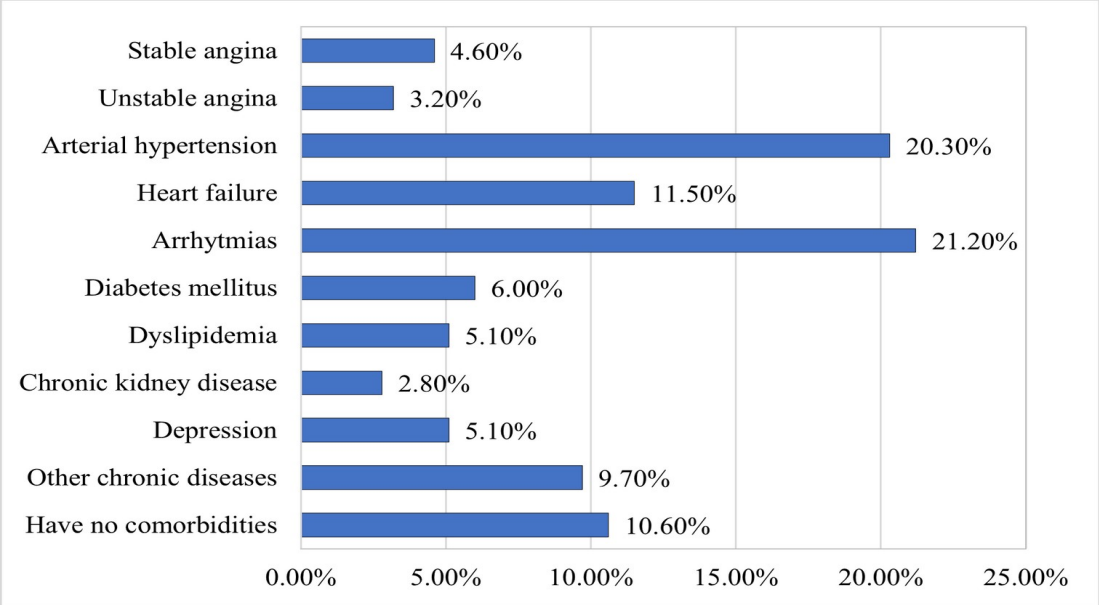
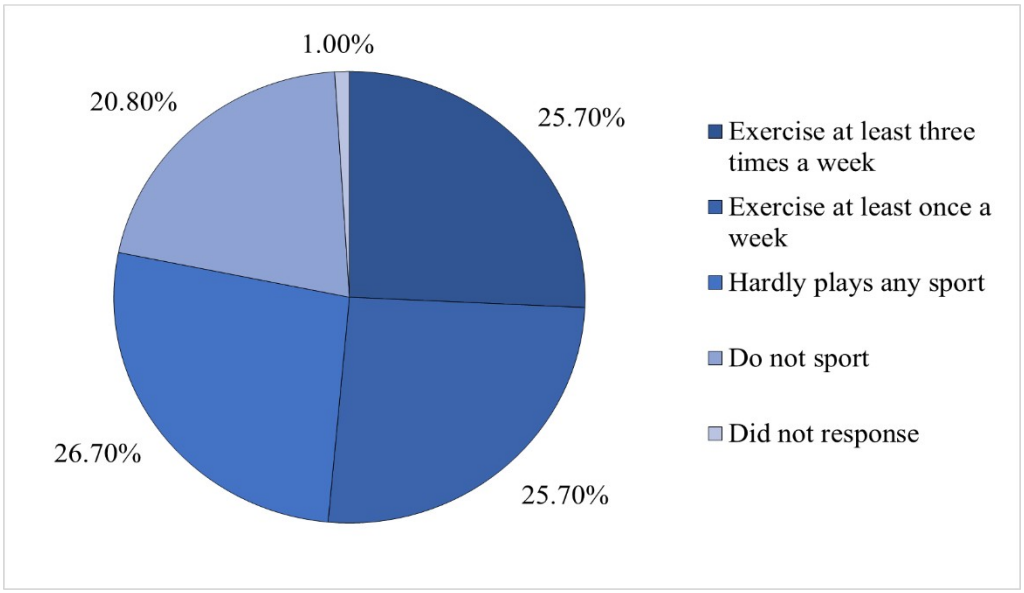


Figure 2. *Patients' physical activity habits.*



3.2. Patients' knowledge about myocardial infarction, its risk factors, complaints, clinical signs, and complications

The majority of respondents identified high cholesterol (13.4 %), stress (12.8 %), smoking (12.5 %), and obesity (11.8 %) as risk factors for MI. The most commonly marked symptoms of MI were severe pressing pain behind the sternum lasting > 20-30 min, a feeling of pressure and tightness in the chest, and cold sweats, correctly identified by more than half of the respondents (Table 1).

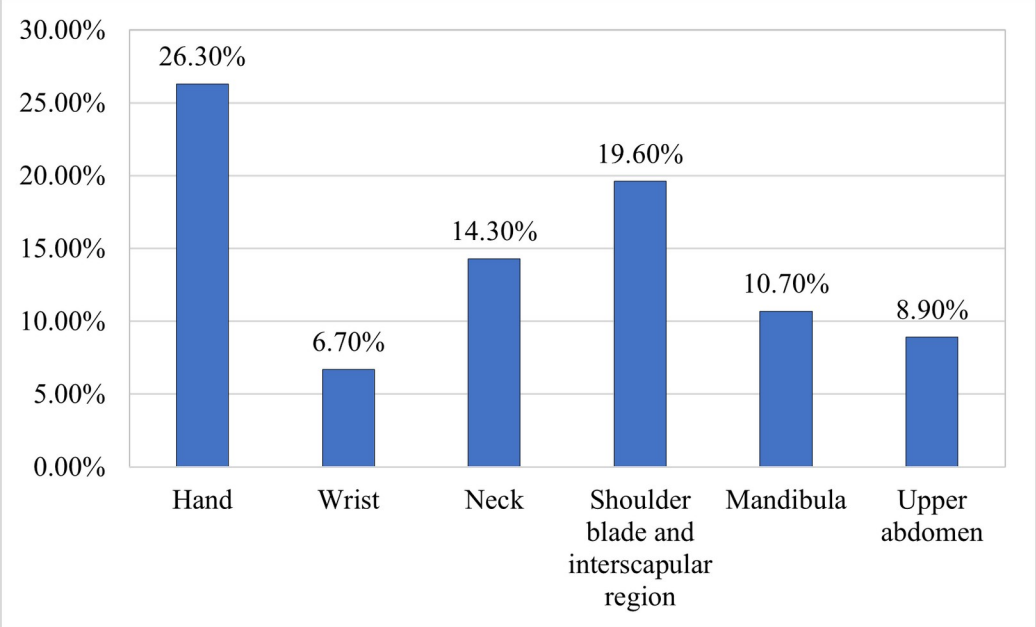
In total, 62.4 % of respondents were aware that MI pain can spread; the most common areas of spread were indicated as the left arm (26.3 %) and the shoulder blade and interscapular region (19.6 %) (Fig. 3).

Sudden death (27.4 %) and heart rupture (26.2 %) were the most commonly marked complications of MI

Table 1. *Patients' knowledge about myocardial infarction clinical signs*

Symptoms of MI	N (%)
Pressing pain behind the sternum lasting >20-30 min	70 (15.5%)
Feeling of pressure and tightness in the chest	64 (14.1%)
Cold sweat	59 (13%)
Heart palpitations	55 (12.1%)
Pain in the gastric area	51 (11.3%)
Dizziness	47 (10.4%)
Nausea, vomiting	38 (8.4%)
Fear of death, anxiety	38 (8.4%)
Bradycardia	26 (5.7%)
Another symptom	5 (1.1%)

Figure 3. *Patients' knowledge about the areas to which myocardial infarction pain can spread.*



3.3. Patients' opinion on myocardial infarction prevention

In the third part of the questionnaire, patients were asked their opinion on whether the public is sufficiently informed about MI, and 67 % of respondents thought that the public was not sufficiently informed. The majority of respondents (36.7 %) wanted to learn about the symptoms of MI from their family doctor, while others wanted to learn about the symptoms from television or radio (32.1 %), special leaflets (16.3 %), and magazines and newspapers (14.8 %). Almost all patients (95 %) thought that raising public awareness of myocardial infarction would help reduce morbidity and mortality from the disease, and only six respondents disagreed with this statement.

4. Discussion

According to the 2015-2018 NHANES (National Health and Nutrition Examination Survey) data, the prevalence of cardiovascular diseases (CVDs), including AH, coronary heart disease, heart failure (HF), and stroke, among adults aged over 20 years old was 49.2 % [11]. Similar data were obtained in our 2020 study as well: cardiovascular diseases were predominant among the respondents; the frequency of these diseases increased with age. This study was one of the few to analyze Lithuanian patients' knowledge about myocardial infarction. A similar study on the causes and prevention of MI in patients was carried out in Lithuania. The study also included patients treated in the cardiology department of one of the Lithuanian hospital. The obtained data revealed that patients chose the correct causes of MI, and their knowledge about prevention was evaluated as good [12]. Our study showed that although there was a high prevalence of risk factors among the respondents, especially low physical activity (Fig. 2), obesity, AH, and other chronic diseases (Fig. 1), not all patients associated these factors with their risk of developing MI. Patients with AH were statistically more likely to identify AH as a risk factor for MI compared with non-AH patients (36 (81.8 %) vs. 23 (40.4 %), $p < 0.01$), and patients who smoked were more likely to identify smoking as a risk factor for MI compared with those who did not smoke (16 (94.1 %) vs. 42 (61.8 %), $p = 0.009$). When assessing other risk factors for MI, such as high cholesterol, obesity, and diabetes, there was no statistically significant difference between patients with a risk factor and identifying it as a risk factor for MI compared to those who did not have it ($p > 0.05$). However, risk factors, including lifestyle, environmental, psychosocial, genetic factors, etc., are important for the development of MI, and identifying individuals with an increased risk of MI is a key challenge for improving prevention [13].

As shown by a systematic analysis of 86 studies conducted between 2008 and 2019 [6], in our study, it was also distinguished that typical MI symptoms, such as pain behind the sternum and a feeling of pressure and tightness in the chest, were known to more respondents than atypical MI symptoms such as nausea, vomiting, anxiety, and fear of dying (Table 1). In total, 70 % of respondents correctly identified the main symptom as pain behind the sternum; however, in other studies, awareness of this symptom was higher, e.g., 94.8 % of respondents in the Munich study identified this symptom [14], as well as 83 % of respondents in Korea [15, 16]. However, there were opposite results as well: in a study in Pakistan,

only 42 % of respondents identified chest pain as a symptom of MI [17], and in the Republic of Guyana, only 40 % identified it [18]. Although other studies have observed a higher level of knowledge in middle-aged and higher-educated (university education) groups [19, 20] or male groups [14, 21] and higher-educated (non-university education) groups [21], in our study, knowledge about the symptoms of MI did not differ between different age, sex and education groups ($p>0.05$). The comparison of the responses in different all the groups mentioned above did not show a statistically significant difference, except that the symptom "bradycardia" was statistically more likely to be selected by people with higher non-university education compared to those with higher university education ($p = 0.02$). In studies in the UK and Korea, 62 % and 50 % of respondents, respectively, identified MI pain as spreading to the left arm or shoulder [5, 15]. In our study in Lithuania, a similar percentage of respondents knew the areas of spread. However, 33.7 % of the respondents said that they were completely unaware that the pain could spread. The analyses suggest that the typical areas of the spread of MI pain are the left shoulder, arm, neck, and mandibula [22, 23], and these were the most frequently identified areas by patients in our study as well, with the additional option of the scapula and scapular region (Fig. 3).

The time between the onset of MI symptoms and the patient's arrival at a medical facility is "golden". It has been estimated that in the case of out-of-hospital shock without cardiac arrest, delaying treatment every 10 minutes between 60 and 180 minutes from first contact with medics resulted in 3.3 additional deaths per 100 PCI-treated patients and 1.3 additional deaths after cardiac arrest in the absence of cardiogenic shock. In stable STEMI patients, the time delay was much less significant (each 10-minute delay between 60 and 180 minutes from first contact with medics caused 0.3 additional deaths per 100 PCI-treated patients) [24]. According to the European Society of Cardiology guidelines, a patient with a suspected myocardial infarction should have an ECG recorded within 10 minutes from the first contact with medics, and the patient must be admitted to a PCI center within 120 minutes of STEMI diagnosis [25]. In most of the literature, time is also defined as muscle ("time is a muscle"), and the longer the lesion and the longer the time to vessel opening, the faster the development of myocardial ischemia [26]. This again underlines the importance of patients and their relatives being able to recognize the symptoms of MI and being able to call for timely medical help by dialing the short emergency number 112 [27]. As better outcomes for patients with MI depend on providing treatment as soon as possible [28], and as predictive factors for delay are associated with lack of knowledge and the weaker manifestation of the main symptom of MI–less severe chest pain [29], it is important to educate patients to recognize the condition as soon as possible. Our study showed that the majority of patients did not feel they had sufficient knowledge, and almost all of them (94.1%) indicated that public education would help to reduce the mortality and morbidity of this disease. A four-month education program in Georgia targeting the elderly (mean age 75 years old) was effective in improving the ability to recognize the signs and symptoms of cardiovascular diseases, including MI [15]. This highlights the importance of educating the public to recognize both typical and atypical

symptoms of MI. Scientists state that individual communication and information between healthcare workers and patients is the best form of education [30]. This was supported by the results of the study as well, as the majority of patients (n = 72) said they would like to receive more information about MI from their family doctor. In a Munich analysis study of the causes of delays in patients who experienced MI, it was observed that people whose main source of information was their family doctor had a higher level of knowledge about MI compared with other sources of information [14]. This can be linked to personalized communication in a language the patient understands and the possibility to discuss atypical symptoms as well. The results of a study carried out in 2017 in the cardiology departments of LSMU Kaunas Clinics also showed a lack of initiative on the part of doctors on education issues. The obtained data revealed that patients received the most information about their disease from nurses, but the majority of patients expected to receive information about innovations in the treatment of MI, methods, and the use of medications from their doctors [31]. As in our study, it was noticed that those with risk factors did not always associate them with a higher risk of having MI. In addition, many people were unaware of atypical symptoms; therefore, public education measures could focus on expanding knowledge in these areas. It has also been identified that MI can present with various combinations of symptoms for up to one-third of patients without the typical symptom of chest pain [32], and a study has revealed a lack of awareness of atypical symptoms, which is why it is essential to emphasize the diversity of symptoms when educating patients.

Inevitably, this study had limitations. Because the study was carried out in a hospital, the respondents were unevenly distributed according to demographics: older people were more likely to be hospitalized, and there were almost no respondents under 30. Women were also more involved in the study than men, therefore, there was no proportional sex distribution. As there were only five respondents who had an MI, we could not compare their responses with those who did not have an MI. The survey was carried out using a questionnaire in which all the answers about risk factors, symptoms, spread, and complications of MI were correct, and the frequency of the selected answers was evaluated, which may have distorted patients' true knowledge to some extent. Moreover, the study was only conducted at LSMU Kaunas Hospital, and the knowledge of the patients hospitalized there was assessed; therefore, it did not reflect the knowledge of the Lithuanian population as a whole about MI.

5. Conclusions

Patients' knowledge about the MI symptoms and risk factors did not differ depending on age, gender and education.Our study revealed that the patients at LSMU Kaunas Hospital had limited knowledge about MI: although more than half of the patients correctly identified the typical symptoms of an MI, such as pain behind the sternum and a feeling of pressure and tightness in the chest, their knowledge about other symptoms was insufficient. Risk factors such as high cholesterol, smoking, and obesity were known to many respondents. The lack of knowledge about MI is important because it can lead to a delayed referral to a medical facility and worse outcomes. This can be reversed by

educating the public about the disease, explaining the prevention of MI, the typical and atypical symptoms, and how to help a person affected by MI. Our study had limitations due to the small sample, and it would be useful to research further to reflect the knowledge of MI of the whole Lithuanian population.

References

1. Anderson HV (“Skip”), Masri SC, Abdallah MS, Chang AM, Cohen MG, Elgendy IY, ir kt. 2022 ACC/AHA Key Data Elements and Definitions for Chest Pain and Acute Myocardial Infarction: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Data Standards. Circ Cardiovasc Qual Outcomes. 2022 m. spalio;15(10):e000112.

2. Wang H, Naghavi M, Allen C, Barber RM, Bhutta ZA, Carter A, ir kt. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet. 2016 m. spalio 8 d.;388(10053):1459–544.

3. Apie mus [Prieiga per internetą]. Heart.lt. [žiūrėta 2022 m. lapkričio 15 d.]. Adresas: https://www.heart.lt/apie-mus/

4. Engdahl J, Holmberg M, Karlson BW, Luepker R, Herlitz J. The epidemiology of out-of-hospital ‘sudden’ cardiac arrest. Resuscitation. 2002 m. kovo 1 d.;52(3):235–45.

5. Whitaker S, Baldwin T, Tahir M, Choudhry O, Senior A, Greenfield S. Public knowledge of the symptoms of myocardial infarction: a street survey in Birmingham, England. Fam Pract. 2012 m. balandžio 1 d.;29(2):168–73.

6. Birnbach B, Höpner J, Mikolajczyk R. Cardiac symptom attribution and knowledge of the symptoms of acute myocardial infarction: a systematic review. BMC Cardiovasc Disord. 2020 m. spalio 14 d.;20(1):445.

7. Kirchberger I, Heier M, Wende R, von Scheidt W, Meisinger C. The patient’s interpretation of myocardial infarction symptoms and its role in the decision process to seek treatment: the MONICA/KORA Myocardial Infarction Registry. Clin Res Cardiol. 2012 m. lapkričio 1 d.;101(11):909–16.

8. Kartschmit N, Birnbach B, Hartwig S, Mikolajczyk R. Knowledge of Symptoms of Acute Myocardial Infarction, Reaction to the Symptoms, and Ability to Perform Cardiopulmonary Resuscitation: Results From a Cross-sectional Survey in Four Regions in Germany. Front Cardiovasc Med. 2022 m. gegužės 16 d.;9:897263.

9. Noureddine S, Dumit NY, Maatouk H. Patients’ knowledge and attitudes about myocardial infarction. Nurs Health Sci. 2020 m. kovo;22(1):49–56.

10. Aboueisha A, Cram P. Differences in Myocardial Infarction and Stroke Knowledge and Awareness Among US- and Foreign-Born Individuals: Potential Causes and Implications. J Am Heart Assoc. 2021 m. gruodžio 7 d.;10(23):e024078.

11. Virani SS, Alonso A, Aparicio HJ, Benjamin EJ, Bittencourt MS, Callaway CW, ir kt. Heart Disease and Stroke Statistics—2021 Update. Circulation. 2021 m. vasario 23 d.;143(8):e254–743.

12. Šakalytė D. Patient’s Knowledge about the Causes of Development and Prevention of Acute Myocardial Infarction. Pacientų žinios apie ūmaus miokardo infarkto atsiradimo priežastis ir prevenciją [Prieiga per internetą].

2020 m. sausio 30 d. [žiūrėta 2022 m. lapkričio 15 d.]; Adresas: http://dspace.kaunokolegija.lt//handle/123456789/2872

13. Zhan C, Shi M, Wu R, He H, Liu X, Shen B. MIRKB: a myocardial infarction risk knowledge base. Database. 2019 m. sausio 1 d.;2019:baz125.

14. Albarqouni L, Smenes K, Meinertz Th, Schunkert H, Fang X, Ronel J, ir kt. Patients' knowledge about symptoms and adequate behaviour during acute myocardial infarction and its impact on delay time: Findings from the multicentre MEDEA Study. Patient Educ Couns. 2016 m. lapkričio 1 d.;99(11):1845–51.

15. Han CH, Kim H, Lee S, Chung JH. Knowledge and Poor Understanding Factors of Stroke and Heart Attack Symptoms. Int J Environ Res Public Health. 2019 m. sausio;16(19):3665.

16. Abdo Ahmed AA, Mohammed Al-Shami A, Jamshed S, Fata Nahas AR, Mohamed Ibrahim MI. Public Awareness of and Action towards Heart Attack Symptoms: An Exploratory Study. Int J Environ Res Public Health. 2020 m. sausio;17(23):8982.

17. Rasool SM, Asad Z, Bhatti AA, Kulsoom A, Chaudhary NA, Rasool AS, ir kt. Assessment of Knowledge of Symptoms of Ischemic Heart Disease in Population Visiting a Tertiary Care Hospital in Pakistan. Cureus. 2019 m. rugpjūčio 25 d.;

18. Johnson CAH, Pitta NC, Dessotte CAM, Dantas RAS, Rossi LA. Knowledge, attitudes, and beliefs about acute coronary syndrome among patients with type 2 diabetes. Rev Lat Am Enfermagem. 2021 m.;29:e3503.

19. Zhang QT, Hu DY, Yang JG, Zhang SY, Zhang XQ, Liu SS. Public knowledge of heart attack symptoms in Beijing residents. Chin Med J (Engl). 2007 m. rugsėjo 20 d.;120(18):1587–91.

20. Goff DC, Sellers DE, McGovern PG, Meischke H, Goldberg RJ, Bittner V, ir kt. Knowledge of heart attack symptoms in a population survey in the United States: The REACT Trial. Rapid Early Action for Coronary Treatment. Arch Intern Med. 1998 m. lapkričio 23 d.;158(21):2329–38.

21. Gkika C, Vasilopoulos G. Knowledge of patients with acute myocardial infarction in relation to risk factors of heart disease. Health Res J. 2018 m. gruodžio 2 d.;4(2):89.

22. Malik MA, Alam Khan S, Safdar S, Taseer IUH. Chest Pain as a presenting complaint in patients with acute myocardial infarction (AMI). Pak J Med Sci. 2013 m. balandžio;29(2):565–8.

23. Mendis S, Thygesen K, Kuulasmaa K, Giampaoli S, Mähönen M, Ngu Blackett K, ir kt. World Health Organization definition of myocardial infarction: 2008-09 revision. Int J Epidemiol. 2011 m. vasario;40(1):139–46.

24. Scholz KH, Maier SKG, Maier LS, Lengenfelder B, Jacobshagen C, Jung J, ir kt. Impact of treatment delay on mortality in ST-segment elevation myocardial infarction (STEMI) patients presenting with and without haemodynamic instability: results from the German prospective, multicentre FITT-STEMI trial. Eur Heart J. 2018 m. balandžio 1 d.;39(13):1065–74.

25. Neumann FJ, Sousa-Uva M, Ahlsson A, Alfonso F, Banning AP, Benedetto U, ir kt. 2018 ESC/EACTS Guidelines on myocardial revascularization. Eur Heart J. 2019 m. sausio 7 d.;40(2):87–165.

26. Mercuri M, Natarajan MK, Velianou JL. ST-elevation myocardial infarction: Is there time for Q waves? CMAJ Can Med Assoc J. 2012 m. liepos 10 d.;184(10):1125–6.

27. Call 999/112 as soon as you experience symptoms of a heart attack | NOCA Adresas: https://www.noca.ie/index.php/news/call-999-112-as-soon-as-you-experience-symptoms-of-a-heart-attack

28. Weaver WD, Simes RJ, Betriu A, Grines CL, Zijlstra F, Garcia E, ir kt. Comparison of primary coronary angioplasty and intravenous thrombolytic therapy for acute myocardial infarction: a quantitative review. JAMA. 1997 m. gruodžio 17 d.;278(23):2093–8.

29. Khan MS, Jafary FH, Faruqui AM, Rasool SI, Hatcher J, Chaturvedi N, ir kt. High prevalence of lack of knowledge of symptoms of acute myocardial infarction inPakistan and its contribution to delayed presentationto the hospital. BMC Public Health. 2007 m. spalio 9 d.;7(1):284.

30. Daukantas V. Vidinės komunikacijos analizė ir efektyvinimas valstybinėje mokesčių inspekcijoje (Šiaulių apskrities pavyzdžiu). 2019m.;123.

31. Minsevičienė R. Miokardo infarktu sirgusių pacientų informuotumo ir mokymo poreikio įvertinimas. 2017m.;71.

32. Canto JG, Shlipak MG, Rogers WJ, Malmgren JA, Frederick PD, Lambrew CT, ir kt. Prevalence, clinical characteristics, and mortality among patients with myocardial infarction presenting without chest pain. JAMA. 2000 m. birželio 28 d.;283(24):3223–9.